



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/825,373	04/16/2004	Atsushi Sakai	251943US2	8393
22850	7590	04/06/2006	EXAMINER	
OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314			DOAN, JENNIFER	
			ART UNIT	PAPER NUMBER
			2874	

DATE MAILED: 04/06/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/825,373

Applicant(s)

SAKAI ET AL.

Examiner

Jennifer Doan

Art Unit

2874

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 December 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2-19 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 4-8 is/are allowed.
- 6) ☒ Claim(s) 2,3,9-11 and 14-19 is/are rejected.
- 7) ☒ Claim(s) 12 and 13 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 012406.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Applicant's communication filed on December 29, 2005, has been carefully studied by the Examiner. The arguments advanced therein, considered together with the amendment made to the claims, are persuasive. In view of further search, however, a relevant document is found; therefore, a new rejection is set forth below. This action is **not** made final.

Specification

1. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Art Unit: 2874

3. Claims 2, 3, 9-11 and 14-19 are rejected under 35 U.S.C. 102(e) as being anticipated by Suhami (U.S. 2004/0175174).

With respect to claim 2, Suhami (figure 11) discloses a light control element comprising a substrate (54); an optical waveguide formed on the substrate (54); an optical coupling component provided on the substrate by a photonic crystal structure, the optical waveguides (53, 58) being connected to the optical coupling component (see paragraph [0207], lines 1-3) and a variable refractive index part provided in a part of the photonic crystal structure, the variable refractive index part dividing the optical coupling component into at least two regions (see paragraph [0207]), wherein an interface between the regions changes a traveling direction of a light incident thereto by causing reflection in at least one wavenumber of the light in response to a change of refractive index in the variable refractive index part (see paragraph [0208]).

With respect to claim 3, Suhami (figures 11 and 12) discloses a light control element comprising a substrate (54); a plurality of optical waveguides (53, 58) formed on the substrate (54); an optical coupling component provided on the substrate, at least three of the optical waveguides being coupled to the optical coupling component (figure 12); and a photonic crystal formed on at least one of the optical waveguides at an end part thereof coupled to the optical coupling component (see paragraph [0207], lines 1-3), the light control element changing a transmittance of light through the optical waveguide in a part corresponding to the photonic crystal structure in response to a change of refractive index of the photonic crystal structure (see paragraph [0208]).

With respect to claim 9, Suhami (figure 11) discloses a light control element, wherein the photonic crystal includes a defect region (56).

With respect to claim 10, Suhami (figure 11) discloses a light control element, wherein the photonic crystal includes at least two layers of photonic crystal arrays at both sides of the defect region, a refractive index being changed for the defect region (see paragraph [0208] and figure 11).

With respect to claim 11, Suhami discloses a light control element, wherein the photonic crystal includes at least two layers of photonic crystal arrays at both sides of the defect region, a refractive index being changed for the entirety of said photonic crystal (see paragraph [0208] and figure 11).

With respect to claim 14, Suhami discloses a light control element, wherein the photonic crystal has a structure having a wave vector component of a light incident to the defect region through the photonic crystal in a direction other than the direction perpendicular to the elongating direction of the defect region (see figure 11).

With respect to claim 15, Suhami discloses a light control element, wherein the photonic crystal includes plural defect regions of different sizes (see figure 11).

With respect to claim 16, Suhami (figure 11) discloses a light control element comprising a substrate (54) having a photonic crystal structure; a plurality of optical waveguides (53, 58) formed in the photonic crystal structure in the form of a line defect of the photonic crystal structure (see paragraph [0207] and figure 11); and a variable refractive index part formed in an optical coupling part, the optical coupling part forming an intersection point where the optical waveguides (53, 58) intersect with each other (see figure 11), the light control element controlling a state of resonance in the optical coupling part by changing a refractive index of the refractive index variable part (see paragraphs [0207] and [0208]).

With respect to claim 17, Suhami (figure 11) discloses a light control element comprising a substrate (54) having a photonic crystal structure; a plurality of optical waveguides (53, 58) formed in the photonic crystal structure of the substrate in the form of a line defect of the photonic crystal structure so as to divide the photonic crystal structure into plural regions (see figure 11); and variable refractive index parts each formed in one of the respective regions of the photonic crystal structure defined by the optical waveguides, each of the variable refractive index parts including a first photonic crystal part and a second photonic crystal part divided from each other diagonally (see figure 11), the light control element (61) changing a refractive index of the first and second photonic crystal parts in each of said regions independently.

With respect to claim 18, Suhami (figure 11) discloses a light control element comprising a substrate (54); NxN optical waveguides (53, 58) formed on the substrate so as to cross with each other at intersections distributed two-dimensionally on the substrate (see paragraph [0207], lines 1-3); and N2 optical coupling components each provided to one of the intersections of the optical waveguides (53, 58), a variable refractive index part provided to each of the optical coupling component, each of the variable refractive index part dividing the optical coupling component into at least two regions (see paragraph [0207]), wherein an interface between the regions changes a traveling direction of a light incident thereto by causing reflection in at least one wavenumber of the light in response to a change of refractive index in the variable refractive index part (see paragraph [0208]).

With respect to claim 19, Suhami (figures 11 and 12) discloses a light control element comprising a substrate (54) having a photonic crystal structure; NxNxN optical

waveguides formed on the substrate so as to cross with each other at intersections distributed two-dimensionally on the substrate (see paragraph [0207], lines 1-3); an optical coupling part formed in each of the intersections, the optical coupling part forming an intersection point where the optical waveguides intersect with each other (see figure 11); each of the optical coupling parts forming a variable refractive index part, the light control (61) controlling a state of resonance in the optical coupling parts by changing a refractive index therein independently (see paragraphs [0207] and [0208]).

Allowable Subject Matter

4. Claims 12 and 13 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The prior art fails to disclose or reasonably suggest a light control element, wherein the photonic crystal includes at least two layers of photonic crystal arrays at both sides of the defect region, each of the photonic crystal arrays including the same number of layers as recited in claim 12.

5. Claims 4-8 are allowed.

The prior art fails to disclose or reasonably suggest a light control element comprising an optical coupling component formed of a photonic crystal and provided on the substrate in a polygonal form, at least four of the optical waveguides being coupled to the optical coupling component; and a plurality of variable refractive index parts formed in the polygonal optical coupling component, the plurality of variable refractive

index parts being formed in one or more regions of the polygonal optical coupling component divided from each other by a diagonal line, the plurality of variable refractive index parts changing a refractive index thereof independently in combination with the other limitations of claims 4-6.

The prior art also fails to disclose or reasonably suggest a light control element comprising first and second photonic crystals formed on an optical waveguide coupled to the optical coupling component at an end part thereof coupled to the optical coupling component, the first photonic crystal including a structure for reflecting or transmitting a transverse electric mode wave, the second photonic crystal including a structure for reflecting or transmitting a transverse magnetic mode wave; and first and second variable refractive index parts provided respectively by the first and second photonic crystals, the first variable refractive index part and the second variable refractive index part respectively changing a transmittance of the transverse electric mode wave and a transmittance of the transverse magnetic mode wave independently from each other in combination with the other limitations of claims 7 and 8.

Response to Arguments

6. Applicant's arguments with respect to claims 2-19 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer Doan whose telephone number is (571) 272-

Art Unit: 2874

2346. The examiner can normally be reached on Monday to Thursday from 6:00 am to 3:30 pm, second Friday off.

8. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rodney Bovernick can be reached on (571) 272-2344. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

9. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JD

March 29, 2006



JENNIFER DOAN
PRIMARY EXAMINER